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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/629,116
Filing Date: July 28, 2003
Appellant(s): MARDILOVICH ET AL.

Steven Nichols
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 11/20/2008 appealing from the Office action mailed 8/21/2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is not correct.

In view of the Applicant's arguments filed in the Appeal Brief, the rejection of claims 49, 51-53,55,57 over Faita (US 5482792) in view of Spear (US 6051331) has been withdrawn because it has been found persuasive.

Claims 53 and 57 are allowable. The remaining claims stand rejected.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is not correct.

In view of the Applicant's arguments filed in the Appeal Brief, the rejection of claims 49, 51-53,55,57 over Faita (US 5482792) in view of Spear (US 6051331) has been withdrawn because it has been found persuasive.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

3503808	Agruss	3-1970
5234722	Ito	8-1993
5482792	Faita	1-1996
6558831	Doshi	5-2003
6051331	Spear	4-2000

Hibino (A low-operating-temperature solid oxide fuel cell in hydrocarbon-air mixtures, Science, vol 288, pgs 2031-2033)

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 55 and 57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention. It is unclear and indefinite as to what constitutes "substantially" uniform pores.

Claim 55 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 55 contracts claim 49 from which it depends. It is unclear as to how pores that vary in diameter through a thickness of said substrate (claim 49) can be also "substantially uniform in size and shape" (claim 55).

Claim 58 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear to the Examiner as to what structure constitutes "pre-selected desired" porosity. It is further unclear whether the Applicant intends to place a comma between "said substrate" and "and" in line 6 of claim 58.

Claims Analysis

The limitation "pre-selected" in "pre-selected desired porosity" has been considered but was not given patentable weight because the courts have held that the method of forming the product is not germane to the issue of patentability of the product itself. "[Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from the product of prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.

Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

The Examiner notes that there is no structural difference between an electrolyte with a porosity that was determined before or during or after the manufacture.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 49, 50, 56, 58, 59, 65, 66 are rejected under 35 U.S.C. 102(b) as being anticipated by Agruss (US 3503808).

Agruss discloses a fuel cell comprising a support substrate supporting a cathode, anode, and electrolyte and a plurality of pores formed through said substrate, said pores having a size and shape formed in accordance with a pre-selected desired porosity. The anode and cathode comprise potassium and thallium and are solid anode and cathode material (claim 58).

The electrolyte is deposited in the pores (2:20-40). Agruss discloses that the support substrate is made of porous Alundum (2:35). Alundum is defined as

Alundum
noun Trademark

A hard material composed of fused alumina, used as an abrasive and a refractory.

Collins English Dictionary, © HarperCollins Publishers 2000

APA | MLA | Chicago : **Citing this entry**
Alundum. (2000). In *Collins English Dictionary*. Retrieved November 24, 2006, from http://www.xreferplus.com/entry/2616224

The Examiner notes that pores formed of fused particles will not be uniform in shape. Due to the irregularity of the pores shapes and sizes, it is noted that the pores will vary in diameter through various cross sections of the Alundum substrate, thus varying in the thickness direction.

Claims 49, 50-52, 55, 56, 58-61, 64, 70-72, 74, 75, 77-81, 83, and 84 are rejected under 35 U.S.C. 102(b) as being anticipated by Ito (US 5234722).

Ito discloses a fuel cell with a solid electrolyte film being formed on a substrate made of flat porous alumina substrate (see Abstract and 6:30-55). The anode and the cathode are disposed on both sides of the porous substrate coated with electrolyte. See fig. 5.

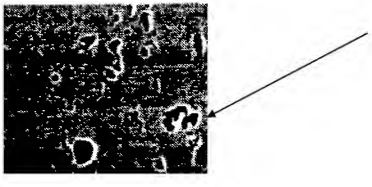
The cathode is made from LaMnO3 and the anode is made from nickel-zirconia cermet (6:15-22). The electrolyte is made from yttria stabilized zirconia (6:34).

Regarding claim 69 and 78, it is noted that in the plasma spray of the electrolyte, a composition of alumina is mixed with the electrolyte material and sprayed on a porous alumina substrate. Thus, in the heating step, the alumina will fuse with the electrolyte, and thus forms a region on a microscopic scale that possesses both the electrolyte and alumina (the porous substrate material). Further, the Specification in par. [0038] supports that any suitable method of depositing the electrolyte may be used. Thus, the electrolyte deposited by plasma spray of Ito will necessarily have the porous substrate mixed with the electrolyte.

Regarding claim 49 and 60, it is noted that the pores are not completely spherical in shape. See fig. 1 and 2. Thus, it is noted that the pores vary in diameter through various cross sections of the alumina substrate, thus varying in the thickness direction.

Regarding claim 51, its pores vary in diameter by tapering to a narrow point between two openings both openings being larger than said narrow point. Refer to a portion of fig. 1 below:

FIG. 1

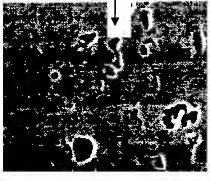


Regarding claims 52 and 61, the pores branch within the substrate. See fig 1 above.

Regarding claim 55 and 57, Fig 1 and 2 depicts images of the porous substrate. Absent a definition of what the Applicant means by "substantially," the pores shown in Fig 2 and 3 meet the limitation "substantially uniform in size and shape."

Regarding claim 64, the pores are parallel. See fig. 1 below:

FIG_1



Claims 58,60-62,64,67 are rejected under 35 U.S.C. 102(b) as being anticipated by Faita (US 5482792).

Faita discloses a bipolar plate and a gasket that supports a cathode, anode, and an electrolyte. Faita's bipolar plate or the gasket reads on Applicant's substrate. See Fig. 1. Faita discloses plurality of pores 2 or 9) and 3 (or 11) (fig. 2 and 3) formed through the bipolar plate or the gasket. The pores branch and taper to a narrow point between the openings of 2(or 9) and 3 (or 11). The branching results in a greater

number of pore openings on a first side of said substrate than on a second side of the substrate. It is noted that the pores 3 (or 11) are smaller than pores 2 (or 9). The electrodes are made of carbon cloth supporting catalyst particles with a binder (13:17-23).

Regarding the limitation "wherein said anode is disposed on said first side of said substrate and said cathode is disposed on said second side of said substrate" (applicant's claims 54 and 63), it is noted that the bipolar plate delivers reactant gases on both sides of the plate to the anode and cathode (7 in fig. 6). Thus, one side of the bipolar plate disposes the anode and another side of the bipolar plate disposes the cathode.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 76 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (US 5234722) as applied to claim 58, in view of Hibino (A low-operating-temperature solid oxide fuel cell in hydrocarbon-air mixtures, Science, vol 288, pgs 2031-2033).

Ito does not disclose that the fuel cell is a single chamber fuel cell. However, Hibino discloses a solid oxide fuel cell that is a single chamber fuel cell. It provides for a

more compact design because the reactant gases do not have to be separated. The compact design also would reduce any issues with sealing the anode and cathode reactant gases from each other. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the fuel cell of Ito a single chamber fuel cell for the benefit of designing a more compact fuel cell.

Claims 73 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (US 5234722) as applied to claim 72, in view of Doshi (US 6558831).

Ito discloses that the fuel electrode is made of nickel-zirconia cermet, but does not disclose that the fuel electrode is made from nickel and yttria-stabilized zirconia cermet. However, Doshi teaches that the anode is a nickel/YSZ. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute Ito's anode material for Doshi's nickel/YSZ because nickel-zirconia cermet and nickel/YSZ are art recognized equivalents as an anode material. See MPEP 2144.06.

Claim 82 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (US 5234722) as applied to claim 81, in view of Doshi (US 6558831).

Ito discloses that the fuel electrode is made of nickel-zirconia cermet, but does not disclose that the fuel electrode is made from nickel and yttria-stabilized zirconia cermet. However, Doshi teaches that the anode is a nickel/YSZ. It would have been

obvious to one of ordinary skill in the art at the time the invention was made to substitute Ito's anode material for Doshi's nickel/YSZ because nickel-zirconia cermet and nickel/YSZ are art recognized equivalents as an anode material. See MPEP 2144.06.

(10) Response to Argument

Applicant argues that claim 55 refers to the desired characteristic that each pore of the plurality of pores is substantially the same (Pg 11 of Appeal Brief).

It is noted that the argument is not commensurate in scope with the claim language. It is noted that the language "each of the uniform pores" is not recited in the claim, and thus, the 35 USC 112, 2nd rejection is maintained.

Applicant argues that the language "pre-selected desired porosity" is clear, referring to the instant Specification par. [0029] (Pg 12 of Appeal Brief).

The Examiner remains unpersuaded. The language "pre-selected desired porosity" is indefinite because it does not describe the metes and boundaries of the porosity. Contrary to the Applicant's assertion, the paragraph 0029 in the Specification relied on for support also does not define what is meant by "pre-selected desired porosity". As stated by the Applicant, it is noted that "pre-selected desired porosity" is a concept (pg 12, line 5 of Appeal Brief), and does not structurally define the porosity (emphasis added).

Applicant argues that the Examiner alleges that Agruss teaches the limitation "said pores having a size that varies in diameter through a thickness of said substrate" without any supporting evidence or citation to the teachings of Agruss (Pg 14 of Appeal Brief).

The Examiner notes that the Applicant has not refuted the Examiner's position stated in the rejection that "the Examiner notes that pores formed of fused particles will not be uniform in shape. Due to the irregularity of the pores shapes and sizes, it is noted that the pores will vary in diameter through various cross sections of the Alundum substrate, thus varying in the thickness direction".

Applicant argues that the electrode materials of Agruss are solutions and not solid cathode and solid anode material because at the elevated temperature in which the fuel cell operates, the electrode material is molten.

The Examiner notes that claim 58 recites a solid cathode material and a solid anode material. It is noted that potassium and thallium are solid materials because at temperature 173 C or below, thallium is solid (3:5-15). Thus, when the fuel cell is starting up from room temperature to its operating temperature, the fuel cell of Agruss would read on the instant claim limitations of "a solid cathode material" and "a solid anode material", and not at its operating temperature. The Examiner notes that the claim does not state that the electrode is solid at its operating temperature.

Applicant argues that Figs. 1 and 2 of Ito do not show pores in the "solid" film (pgs 16 and 17 of Appeal Brief) because the micrographs how both a film material and a stabilizing material.

It is unclear as to what exactly the Applicant is arguing. It is unclear if the Applicant is arguing that the pores referred to by the Examiner in the micrographs are not pores but a stabilizing material. Should this be the Applicant's position, it is noted that the stabilizing material (ZrO2) is not a separate component of the film material (Y2O3). See 6:32-35 and Table 1. Thus, the Examiner maintains that the irregular shapes depicted in the micrographs are in actuality "pores".

Applicant argues that Fig. 1 does not illustrate a pore shape with two openings and tapering to a narrow point between such openings (emphasis in original) (Pg 18 of Appeal Brief).

The Examiner notes that various regions of the pores would read on Applicant's "openings."

Applicant argues that Ito does not disclose "said pores having a size and shape formed in accordance with a pre-selected desired porosity" (Pg 18-19 of Appeal Brief).

In light of the 35 USC 112, 2nd rejection, it is noted that the porosity has been pre-selected because the electrolyte is made as a porous material and has been predetermined by Ito that the porosity is less than 5% as stated in the Abstract of Ito.

Applicant argues that Faita discloses a bipolar plate ***at the outside of*** *an electrochemical cell with holes for admitting gases to the enclosed electrochemical cell (Pgs 19-23 of Appeal Brief) and therefore does not "support" a cathode and anode.*

The Examiner respectfully disagrees. The Examiner notes that the claim does not require the pores to be located inside the region of contact with the electrode. Nonetheless, refer to Fig. 6. The bipolar plate (1) supports electrodes (7) on both sides of the bipolar plate (1). Although the Applicant argues that one of skill in the art would never confuse the gas pathway holes in a plate with claimed pores having a size and shape formed in accordance with a pre-selected desired porosity, the Examiner notes that the gas pathway holes still read on Applicant's "pores." Furthermore, should the Applicant be arguing that the bipolar plate is hollow, and is merely a frame, the Examiner disagrees because the bipolar plate (1) may have a flat surface in the area of contact with the collector (14) (5:53-55).

Applicant argues that Spear does not teach how to form "pores" of Faita in a ceramic substrate (Pg 22 of Appeal Brief).

The Examiner notes that the bipolar plates of Spear have holes. See Fig 3. Thus, one of ordinary skill in the art would know how to form holes of Faita in ceramic.

Applicant argues that Spear does not teach a peripheral frame through which gases flow to and from a cell.

The Examiner respectfully disagrees. The bipolar plate of Spear flow gases to and from a cell. Refer to Fig. 5 and 9:45-53.

Applicant argues that Faita and Spear does not disclose "wherein said pores vary in diameter by tapering to a narrow point between two openings, both openings being larger than said narrow point" and claim 57 "wherein said substrate comprises a second plurality of substantially uniform pores formed through said substrate wherein an average size of said second plurality of pores is smaller than said first plurality of pores." (Pg 24-25 of Appeal Brief).

This argument has been found persuasive and the rejection has been withdrawn. Accordingly, claims 53 and 57 are indicated allowable.

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter:

Prior art does not disclose nor suggest "wherein branching of said pores results in a greater number of pore openings on a first side of said substrate than on a second side of said substrate" as recited in claim 53 and "wherein said substrate comprises a second plurality of substantially uniform pores formed through said substrate wherein an average size of said second plurality of pores is smaller than said first plurality of pores" as recited in claim 57.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Cynthia Lee/

Examiner, Art Unit 1795

Conferees:

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795

/Dah-Wei D. Yuan/

Supervisory Patent Examiner, Art Unit 1795

Appendix A: Hibino (A low-operating-temperature solid oxide fuel cell in hydrocarbon-air mixtures, Science, vol 288, pgs 2031-2033)